PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2427919/DH/GJM	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/AU01/00717**	International Filing Date *(day/month/year)* 15 June 2001	Priority Date *(day/month/year)* 15 June 2000
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] H01L 25/075, 33/00, 27/15, H05B 33/02		
Applicant SYSTEMAX PTY. LTD. et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheet(s).

3. This report contains indications relating to the following items:

I	[X]	Basis of the report
II	[X]	Priority
III	[ ]	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	[ ]	Lack of unity of invention
V	[X]	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	[ ]	Certain documents cited
VII	[ ]	Certain defects in the international application
VIII	[ ]	Certain observations on the international application

Date of submission of the demand 5 September 2001	Date of completion of the report 4 December 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **I.A.BARRETT** Telephone No. (02) 6283 2189

International application no.
PCT/AU01/00717

Box No. III AGENT OR COMMON REPRESENTATIVE: OR ADDRESS FOR CORRESPONDENCE

The following person is [X] agent [ ] common representative

and [X] has been appointed earlier and represents the applicant(s) also for international preliminary examination.

[ ] is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

[ ] is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

HENSHAW, Damon
ALLEN, Leon
HIND, Raymond

DAVIES COLLISON CAVE
1 Little Collins Street
Melbourne
Victoria 3000
Australia

Telephone No.: +61 3 9254 2777
Facsimile No.: +61 3 9254 2770
Electronic Mail: mail@davies.com.au

[ ] **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination **to start on the basis of:**

[X] the international application as originally filed

the description [ ] as originally filed
[ ] as amended under Article 34

the claims [ ] as originally filed
[ ] as amended under Article 19 (together with any accompanying statement)
[ ] as amended under Article 34

the drawings [ ] as originally filed
[ ] as amended under Article 34

2. [ ] The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. [ ] The applicant wishes the start of the international preliminary examination **to be postponed** until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69. 1(d)). *This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

- Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

[X] which is the language in which the international application was filed.
[ ] which is the language of a translation furnished for the purposes of international search.
[ ] which is the language of publication of the international application.
[ ] which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby **elects all eligible States** *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

Excluding the following States which the applicant wishes **not to elect:**

International application no.
PCT/AU01/00717

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

For International Preliminary Examining Authority use only

					received	not received
1.	translation of international application	:		sheets	☐	☐
2.	amendments under Article 34	:		sheets	☐	☐
3.	copy (or, where required, translation) of amendments under Article 19	:		sheets	☐	☐
4.	copy (or, where required, translation) of statement under Article 19	:		sheets	☐	☐
5.	letter	:	1	sheets	☐	☐
6.	other *(specify)*	:		sheets	☐	☐

The demand is also accompanied by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☐ copy of general power of attorney: reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ nucleotide and or amino acid sequence listing in computer readable form
6. ☐ other *(specify)*:

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

HENSHAW, Damon
For and on behalf of
the applicants

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority dated as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority dated, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

See Notes to the demand form

The demand must be filed directly with the competent International Preliminary Examining Authority the one chosen by the applicant. The name or two-letter code of that Authority may be indicated if two or more Authorities are competent with the applicant on the line below.

1 V/_____

PCT

CHAPTER II

DEMAND

Under Article 31 of the Patent Cooperation Treaty:
The Undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA	Date of receipt of DEMAND

Box No. 1 IDENTIFICATION OF THE INTERNATIONAL APPLICATION

Applicant's or agent's file reference: 2427919DH

International application No.	International filing date (*day/month/year*)	(Earliest) Priority date (*day/month/year*)
PCT/AU01/00717	15 June 2001 15/6/01	15 June 2000 15/6/00

Title of invention

LED LAMP

Box No. II APPLICANT(S)

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

SYSTEMAX PTY. LTD.
Suite 3, Level 7
Chatswood Central, North Tower
1-5 Railway Street
Chatswood, New South Wales 2067
Australia

Telephone No.:

Facsimile No.:

Teleprinter No.:

State (*that is, country*) of nationality:	State (*that is, country*) of residence:
AU	AU

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

Q1 (PACIFIC) LIMITED
C/- PricewaterhouseCoopers
22nd Floor
Prince's Building
Hong Kong
China

State (*that is, country*) of nationality:	State (*that is, country*) of residence:
CN	CN

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

JEGANATHAN, Balu
28 Manhattan Terrace
Rowville, Victoria 3178

Australia

State (*that is, country*) of nationality:	State (*that is, country*) of residence:
AU	AU

[X] Further applicants are indicated on a continuation sheet.

International application no.
PCT/AU01/00717

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

MONTAGNAT, John, Albert
59 Old Lilydale Road
East Ringwood, Victoria 3135
Australia

State *(that is, country)* of nationality:	State *(that is, country)* of residence:
AU	AU

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

State *(that is, country)* of nationality:	State *(that is, country)* of residence:

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

State *(that is, country)* of nationality:	State *(that is, country)* of residence:

Name and address: *(Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)*

State *(that is, country)* of nationality:	State *(that is, country)* of residence:

☐ Further applicants are indicated on another continuation sheet.

Summary of the Invention

In accordance with the present invention, there is provided a lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover, wherein the junctions are provided in a three-dimensional array.

In another aspect, there is provided a lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover, wherein the junctions are mounted to a curved support structure so as to be arranged substantially on an imaginary spheroid surface.

The common layer of fluorescent material can serve to receive light from adjacent junctions and transmit same in a distributed fashion, so that the resultant light appears, to the naked eye, to be emanating from a single point source of illumination. Further, the layer can be applied over the junctions in a single step, and that in turn can lead to substantial simplification in the procedure for constructing the lamp, as compared to formation of the discrete chips of US 5289082, which would need to be individually constructed or produced using additional steps of masking and etching.

Preferably, the lamp includes a globe portion and the junctions are embedded within the globe portion so that the lamp is formed as a unitary structure.

Preferably, the junctions are mounted to, and electrically coupled with, at least one curved conductor.

In another broad aspect, the invention provides a lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array, wherein the lamp includes a common layer of fluorescent material over at least adjacent junctions.

In yet another aspect, there is provided a lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array, wherein the at least one curved conductor includes a recess for receipt of a respective one of the junctions.

Preferably, the at least one curved conductor is configured such that junctions are arranged substantially on an imaginary spheroid surface.

The curved configuration of the conductors and, in particular, the junctions being arranged on a substantially spheroid imaginary surface provides an advantage that the overall light generated by the lamp will appear to be coming from a generally singular small spherical or point source.

Preferably, the recess has side walls which function as an optical guide for controlling the direction of light transmission and/or the angle of divergence.

Preferably, the lamp includes a globe portion, with the junctions and the at least one curved conductor being embedded within the globe portion so that the lamp is formed as a unitary structure.

Preferably, the lamp includes a lens adapted to fit with the globe portion, and configured to shape the light emitted from the globe portion into a predetermined pattern.

Brief Description of the Drawings

The invention will be described in more detail with reference to the drawings in which:
Figure 1 is a side-view of an LED lamp;
Figure 2 is a plan-view of the lamp of Figure 1;
Figure 3 is a circuit diagram for the lamp of Figures 1 and 2;
Figure 4 is a diagrammatic cross-sectional view of a second LED lamp;
Figure 5 is a circuit diagram of the lamp of Figure 4;
Figure 6 is a cross-sectional view of the lamp of Figure 4;

The claims

1. A lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover, wherein the junctions are provided in a three-dimensional array.

2. A lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover, wherein the junctions are mounted to a curved support structure so as to be arranged substantially on an imaginary spheroid surface.

3. A lamp as claimed in claim 1 or 2, wherein the lamp includes a globe portion and the junctions are embedded within the globe portion so that the lamp is formed as a unitary structure.

4. A lamp as claimed in any one of claims 1 to 3, wherein the junctions are mounted to, and electrically coupled with, at least one curved conductor.

5. A lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array, wherein the lamp includes a common layer of fluorescent material over at least adjacent junctions.

6. A lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array, wherein the at least one curved conductor includes a recess for receipt of a respective one of the junctions.

7. A lamp as claimed in claim 6, wherein the at least one curved conductor is configured such that junctions are arranged substantially on an imaginary spheroid surface.

8. A lamp as claimed in claim 6 or 7, wherein the recess has side walls which function as an optical guide for controlling the direction of light transmission and/or the angle of divergence.

9. A lamp as claimed in any one of claims 5 to 8, wherein the lamp includes a globe portion, with the junctions and the at least one curved conductor being embedded within the globe portion so that the lamp is formed as a unitary structure.

10. A lamp as claimed in claim 9, wherein the lamp includes a lens adapted to fit with the globe portion, and configured to shape the light emitted from the globe portion into a predetermined pattern.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU01/00717

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1,4-8,** as originally filed,
pages , filed with the demand,
pages **2,3,** received on **20 November 2001** with the letter of **19 November 2001**

☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **9,10,** received on **20 November 2001** with the letter of **19 November 2001**

☒ the drawings, pages **1-6,** as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supp rting such statement

1. Statement

Novelty (N)	Claims	**1-10**	**YES**
	Claims		**NO**
Inventive step (IS)	Claims	**1-10**	**YES**
	Claims		**NO**
Industrial applicability (IA)	Claims	**1-10**	**YES**
	Claims		**NO**

2. Citations and explanations (Rule 70.7)

The prior art does not disclose a plurality of light emitting junctions and:-

(a) a common layer of fluorescent material thereover, wherein the junctions are in a three-dimensional array (claim 1)

(b) a common layer of fluorescent material thereover, wherein the junctions are mounted on a curved support structure (claim 2 or 5)

(c) light emitting junctions on a curved conductor, with a recess for one of the junctions. (claim 6)

The curved configuration of the conductors, or the three-dimensional array of junctions, provides the advantage that light from the light source appears to be coming from a generally singular small spherical light source (see page 3 line 5-8). Claims 1, 2 and 5, and appended claims, are considered novel and inventive.

The recess for at least one light emitting junction assists in controlling directional output of light (see page 7 line 7-25). Claim 6 and appended claims are considered novel and inventive over the prior art.

The invention of claims 1-10 is novel and inventive, and has industrial applicability.

II. Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:

   ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).

   ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).

2. ☒ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1).

Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

There is no disclosure in the priority document of the invention as presently claimed. The claims were considered to have a priority date being the international filing date of 15 June 2001.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

FRIDAY 14 SEP 2001

PCT

To. Agent :

DAVIES COLLISON CAVE
1 Little Collins Street
MELBOURNE VIC 3000

NOTIFICATION OF RECEIPT
OF DEMAND BY COMPETENT INTERNATIONAL
PRELIMINARY EXAMINING AUTHORITY

(PCT Rule 59.3(e) and 61.1(b), first sentence
and Administrative Instructions, Section 601(a))

Date of mailing *(day/month/year)*	13 SEP 2001 (13/9/01)
Applicant's or agent's file reference: 2427919	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/AU01/00717	15 JUN 2001 (15/6/01)	15 JUN 2000 (15/6/00)

Applicant: Systemax Pty. Ltd. (et al.)

1. The applicant is hereby **notified** that this International Preliminary Examining Authority considers the following date as the date of receipt of the demand for international preliminary examination of the international application:

5 SEP 2001 (5/9/01)

2. That date of receipt is:

- [x] the actual date of receipt of the demand by this Authority (Rule 61.1(b)).
- [ ] the actual date of receipt of the demand on behalf of this Authority (Rule 59.3(e)).
- [ ] the date on which this Authority has, in response to the Invitation to correct defects in the demand (Form PCT/IPEA/404), received the required corrections.

3. [ ] **Attention:** That date of receipt is **AFTER** the expiration of 19 months from the priority date. Consequently, the elections(s) made in the demand does (do) not have the effect of postponing the entry into the national phase until 30 months from the priority date (or later in some Offices) (Article 39(1)). Therefore, the acts for entry into the national phase must be performed within 20 months from the priority date (or later in some Offices) (Article 22). For details, see the *PCT Applicant's Guide, Volume II.*

[ ] *(If applicable)* This notification confirms the information given by telephone, facsimile transmission or in person on:

4. Only where paragraph 3 applies, a copy of this notification has been sent to the International Bureau.

Name and mailing address of the IPEA/AU **AUSTRALIAN PATENT OFFICE** **PO BOX 200, WODEN ACT 2606, AUSTRALIA** E-mail: pct@ipaustralia.gov.au Facsimile No. 02 6285 3929	Authorized officer DAVID WATT Telephone No. 02 6283 2357

Form PCT/IPEA/402 (July 1998)

ATENT COOPERATION TREA

FRIDAY 07 DEC 2001

From the:
INTERNAT... .AL PRELIMINARY EXAMINING AUTHORITY

To:

...AVIES COLLISON CAVE
1 Little Collins Street
MELBOURNE VIC 3000

PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

DH

Date of mailing *day/month/year*	7 DEC 2001
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
2427919/DH/GJM	

International Application No.	International Filing Date	Priority Date
PCT/AU01/00717	15 June 2001	15 June 2000

Applicant

SYSTEMAX PTY. LTD. et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide

Name and mailing address of the IPEA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	I.A.BARRETT Telephone No. (02) 6283 2189

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

DAVIES COLLISON CAVE
Little Collins Street
MELBOURNE VIC 3000

Resp due 20-10-01

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 20 August 2001
Applicant's or agent's file reference 2427919DH	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/AU01/00717**	International filing date 15 June 2001
Applicant SYSTEMAX PTY. LTD. et al	

1. [X] The applicant is hereby notified that the international search report has been established and is transmitted herewith

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau.

If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later)

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **I.A.BARRETT** Telephone No. (02) 6283 2189

(See notes on accompanying sheet)

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
HENSHAW, Damon
Davies Collison Cave
1 Little Collins Street
Melbourne, Victoria 3000
AUSTRALIE

MONDAY, - 7 JAN 2002

Date of mailing (day/month/year)	
20 December 2001 (20.12.01)	
Applicant's or agent's file reference	**IMPORTANT NOTICE**
2427919DH	

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/AU01/00717	15 June 2001 (15.06.01)	15 June 2000 (15.06.00)

Applicant
SYSTEMAX PTY. LTD. et al

1. Notice is hereby given that the International Bureau has **communicated**, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:
   KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,EA,EC,EE, EP,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD, MG,MK,MN,MW,MX,MZ,NO,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,

   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on
   20 December 2001 (20.12.01) under No. WO 01/97287

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and the PCT Applicant's Guide, Volume II.

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Authorized officer
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PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
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in its capacity as elected Office

Date of mailing: 20 December 2001 (20.12.01)	
International application No.: PCT/AU01/00717	Applicant's or agent's file reference: 2427919DH
International filing date: 15 June 2001 (15.06.01)	Priority date: 15 June 2000 (15.06.00)
Applicant: JEGANATHAN, Balu et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

05 September 2001 (05.09.01)

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2. The election [X] was

[ ] was not

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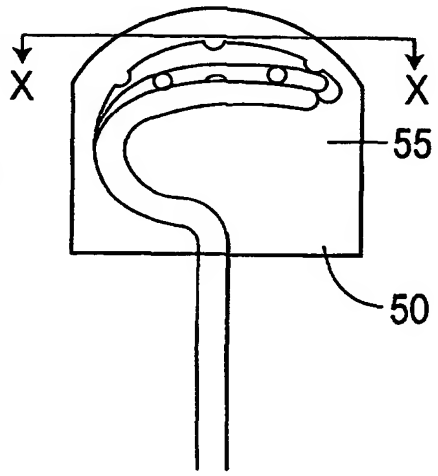
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LED LAMP



(57) Abstract: A lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover. The invention provides a lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array.

WO 01/97287 A1

LED LAMP

Field of the Invention

The present invention relates to an LED lamp.

Background of the Invention

US Patent No. 5998925 discloses a light emitting device which comprises a semi-conductor light emitting layer embedded in a transparent globe. A fluorescent material covers the semi-conductor layer to receive the emitted light for transmission at a different wavelength, i.e. in a predetermined colour.

To increase the intensity of the light output, additional semi-conductor devices may be added, such as shown in US Patent No. 5289082, which discloses an LED lamp having a plurality of semi-conductive chips mounted in a translucent body. Each chip emits a discrete light pattern, however, and that may be undesirable if the light from the lamp is desired to have an appearance of emitting from a single, point-like light source. In US 5289082, the discrete light outputs are combined and focussed, by specific shaping of the body to produce an overall light output having a required illumination pattern.

GB 2311126 discloses a comparatively large scale light source which includes an array of separately mounted light emitting diodes which appear to have respective leads hardwired to a planar conductor. The diodes are encapsulated by a lens which is used to focus the light from the array.

Object of the Invention

The present invention seeks to provide an alternative form of LED lamp which can provide high intensity output by utilising a plurality of light emitting diodes, whilst maintaining the appearance of a substantially point source of illumination.

Summary of the Invention

In accordance with the present invention, there is provided a lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover.

The common layer of fluorescent material can serve to receive light from adjacent junctions and transmit same in a distributed fashion, so that the resultant light appears, to the naked eye, to be emanating from a single point source of illumination. Further, the layer can be applied over the junctions in a single step, and that in turn can lead to substantial simplification in the procedure for constructing the lamp, as compared to formation of the discrete chips of US 5289082, which would need to be individually constructed or produced using additional steps of masking and etching.

Preferably, the lamp includes a globe portion and the junctions are embedded within the globe portion so that the lamp is formed as a unitary structure.

Preferably, the junctions are provided in a three-dimensional array.

Preferably, the junctions are mounted to a curved support structure so as to be arranged substantially on an imaginary spheroid surface.

Preferably, the junctions are mounted to, and electrically coupled with, at least one curved conductor.

In another broad aspect, the invention provides a lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array.

Preferably, the at least one curved conductor is configured such that junctions are arranged substantially on an imaginary spheroid surface.

Preferably, the lamp includes a common layer of fluorescent material over at least adjacent junctions.

The curved configuration of the conductors and, in particular, the junctions being arranged on a substantially spheroid imaginary surface provides an advantage that the overall light generated by the lamp will appear to be coming from a generally singular small spherical or point source.

Preferably, the at least one curved conductor includes a recess for receipt of a respective one of the junctions.

Preferably, the recess has side walls which function as an optical guide for controlling the direction of light transmission and/or the angle of divergence.

Preferably, the lamp includes a globe portion, with the junctions and the at least one curved conductor being embedded within the globe portion so that the lamp is formed as a unitary structure.

Preferably, the lamp includes a lens adapted to fit with the globe portion, and configured to shape the light emitted from the globe portion into a predetermined pattern.

Brief Description of the Drawings

The invention will be described in more detail with reference to the drawings in which:
Figure 1 is a side-view of an LED lamp;
Figure 2 is a plan-view of the lamp of Figure 1;
Figure 3 is a circuit diagram for the lamp of Figures 1 and 2;
Figure 4 is a diagrammatic cross-sectional view of a second LED lamp;
Figure 5 is a circuit diagram of the lamp of Figure 4;
Figure 6 is a cross-sectional view of the lamp of Figure 4;

Figure 7 is a plan view of the lamp of Figure 4;

Figure 8 is a representation of an illumination pattern of the lamp of Figures 4 to 7;

Figure 9 is a plan view of a third lamp;

Figure 10 is a circuit diagram for the lamp of Figure 9;

Figure 11 is a front view of the lamp of Figure 9;

Figure 12 is a side view of the lamp of Figure 9;

Figure 13 is a side view of a lens for fitting on the lamp of Figure 9;

Figure 14 is a cross-sectional view taken along the line X-X shown in Figure 9;

Figure 15 is a cross-sectional view taken along the line Y-Y shown in Figure 10; and,

Figure 16 is a representation of the illumination pattern produced by the lamp of Figures 9 to 12.

Detailed Description of a Preferred Embodiment

The lamp1, as shown in Figure 1, includes a globe portion 2 with a cylindrical base 3 and a parabolic end 4, configured to enhance illumination output in an axial direction of the lamp. The lamp also includes first and second terminals, which are preferably in the form of conductors 5,6 which are embedded within the globe portion 2. The lead 5 has a support platform 7 to which is mounted an integrated circuit wafer 8. In the example given, the wafer includes two junctions which are arranged substantially adjacent each other so that a common layer of fluorescent material, such as a phosphor layer, may be applied over both junctions. Intermediate conductors 9 to 12 electrically couple the junctions to the respective terminals 5,6 so that the LED junctions 14,15 are arranged in reverse polarity, as indicated in the circuit diagram Figure 3. A resistive element 16 is provided between a further conductor 13 (connecting the intermediate conductors 11 and 12) and the lead 5.

The conductors 5,6, intermediate conductors 9 to 13, and wafer 8 are all embedded within the globe portion 2 so that the lamp is presented as a robust unitary structure. The reverse polarity of the junctions allows the lamp to be connected to a power source without concern for polarity, as compared to the case with a conventional LED arrangement. The

use of a single phosphor layer, common to each of the junctions, also simplifies manufacture and provides an aesthetic advantage in that the light from either junction is perceived to originate from a single source.

In a preferred form of the LED lamp, the following specifications may apply:

NOMINAL SIZE	-	9.5mm diameter
LIGHT COLOUR	-	WHITE
GLOBE COLOUR	-	WATER CLEAR
LIGHT INTENSITY	-	SUPERBRIGHT
		TYPICAL LIGHT OUTPUT > 500mCd @ 20mA
GUARANTEED LIFE	-	30,000 HOURS
FOCUS	-	HALF ANGLE 15° typ.
BASE STYLE	-	INTERCHANGEABLE WITH WEDGE TYPE LAMPS
LEAD DIMENSIONS	-	6mm nom. OUTSIDE BASE WEDGE
SUPPLY VOLTAGE	-	12VOLTS nom. {>11.5<14 volts AC or DC}
FORWARD CURRENT	-	20 +8/-3 mA @ 12Volts
FORWARD VOLTAGE	-	3.6 min(typ) 4.0max. @ 20mA
REVERSE VOLTAGE	-	5Volts min.
POWER DISSIPATION	-	LED JUNCTIONS 120Mw
		RESISTOR 170mW
REVERSE CURRENT	-	50 x 10^{-3} mA max. @ 5V
INTERNAL RESISTOR	-	430 ohms nom.

It should, however, be appreciated that the size configuration and operating parameters of any of the component parts of the lamp may vary, as required and the number of LED junctions may also be increased to suit illumination needs.

A second lamp 20 is now described with reference to Figures 4 to 8. The lamp 20 is generally similar in construction to that of Figures 1 to 3, in sofar as first and second terminals 21 and 22 are provided, in the form of conductors 23,24 embedded in a globe portion 25, together with additional conductors 26,27. Each of the conductors 23,26 and

27 have a respective recess 28, to profile support structure for receiving an associated junction, indicated by reference numerals 29,30,31.. The junctions are covered by a common layer of phosphor 35 and are electrically coupled between each respective conductors 23,26,27 to which they are mounted, and the adjacent conductor via intermediate conductors 32,33,34. In the example shown, the junctions are serially connected, as represented by the circuit diagram of Figure 5.

All of the conductors 23, 24,26,27 are preferably formed in a two dimensional lead frame structure 40 shown in Figure 6, to allow ease of manufacture and reliability in directly positioning the junctions 29,30,31 within the globe portion 25, after application of the phosphor layer 35. As can be seen from both Figures 6 and 7, the junctions 29,30,31 are arranged in a generally linear array, with the conductors 23,27 projecting above the conductor 26 so that the overall illumination generated by the junctions will be somewhat enhanced on-axis, as represented in Figure 8 by curve A.

The lamp 20 may also be provided with a lens 41 which is fitted to the globe portion 25 and shaped so as to modify the light generated by the lamp to produce, for example, the illumination pattern represented by curve B in Figure 8, whereby the output illumination is somewhat more evenly distributed.

Turning now to Figures 9 to 16, a third lamp 50 is illustrated. Again, the lamp 50 is in general similar to the previous lamp construction in sofar as a plurality of conductors 51,52,53 and 54 are embedded within a unitary globe portion 55 and have light emitting junctions 56 mounted in respective recesses 57 and covered by a common layer of fluorescent material 59. Each junction is again electrically coupled to the respective conductor to which it is mounted and an adjacent conductor via intermediate conductors 58 so as to form the circuit illustrated in Figure 10. Each of the conductors 51 to 54, in this instance, however, carrying three junctions 56.

The conductors 51 to 54 are curved within the globe portion 55 so as to support the junctions on an imaginary curved surface such as a spheroid and, in that manner, the

illumination generated by the lamp 50 will have an appearance of emanating from a small, generally spheroid point like source. A lens 60 may also be provided for modifying the output of the junctions to produce a more even distribution pattern such as represented by curve C in Figure 16, which is the illumination output observed from a plan view of the lamp 50, i.e. when the lamp is seen from the same direction as viewed in Figure 9.

In addition to modifying the light output by using the lens 60, it is also possible to arrange the conductors in any desired configuration and the construction of the recesses 57 may also be used to assist in controlling the directional output of the light emitted from the various junctions. In particular, the configuration of each recess may be such that for example, the recess side walls act as optical guides to control the direction and/or angle of divergence of light emitted from each junction.

More specifically, the shape of each recess and its effect on the light output from the junctions will now be described in more detail with reference to Figures 14 and 15, which show cross-sectional views of the relevant conductors taken along the lines X-X and Y-Y shown in Figures 11 and 12 respectively.

The recesses 57 containing the LED junctions are positioned and shaped in the conductors 51,52,53 so that the beams of light emerging from the recesses may be combined in free space outside the lamp 50 in predictable patterns determined by the radius of the imaginary part spherical surface designated 'R', the distance from the LED junction in the recess to the intersection of the imaginary extension of the sides of a recess - designated 'r' and the angle 'A' between the centre line 61 of the lamp 50 and a centre line 62 passing through the perpendicular to any other LED junction.

The radius 'R' of the imaginary spherical surface is the distance from the intersection of those centre lines to the LED junction within the recess. The angle between the sides of a recess determines the value of the 'r'.

In the limiting case where 'r' is equal to or greater than 'R", the light from each LED junction will be shaped by the recesses into beams which do not cross, regardless of the value of angle 'A'. For all values of 'r' less than 'R' it will be possible to have the light beam from each LED junction coincide with the edges of the light beams from adjacent LED junctions. The exact positioning if this instance will be determined by the ratio R/r and the value of angle 'A'.

As may be appreciated from the above, the present invention allows considerable scope for obtaining a light source using junction diodes, with a predetermined one of a variety of output illumination patterns whilst maintaining a generally simple construction. A particular advantage is that the various junctions are of small size and may be configured to produce a light output which may be perceived by the naked eye to be emanating from a single point source of light.

The above LED lamps have been described by way of non-limiting example only, and many modifications and variations may be made thereto without departing from the spirit and scope of the invention as hereinbefore described.

The claims

1. A lamp including a plurality of semi-conductor light emitting junctions with a common layer of fluorescent material arranged thereover.

2. A lamp as claimed in claim 1, wherein the lamp includes a globe portion and the junctions are embedded within the globe portion so that the lamp is formed as a unitary structure.

3. A lamp as claimed in claim 1 or 2, wherein the junctions are provided in a three-dimensional array.

4. A lamp as claimed in any one of claims 1 to 3, wherein the junctions are mounted to a curved support structure so as to be arranged substantially on an imaginary spheroid surface.

5. A lamp as claimed in claim 4, wherein the junctions are mounted to, and electrically coupled with, at least one curved conductor.

6. A lamp including a plurality of light emitting junctions mounted to at least one curved conductor so as to adopt a three-dimensional array.

7. A lamp as claimed in claim 6, wherein the at least one curved conductor is configured such that junctions are arranged substantially on an imaginary spheroid surface.

8. A lamp as claimed in claim 6 or 7, wherein the lamp includes a common layer of fluorescent material over at least adjacent junctions.

9. A lamp as claimed in any one of claims 6 to 8, wherein the at least one curved conductor includes a recess for receipt of a respective one of the junctions.

10. A lamp as claimed in claim 9, wherein the recess has side walls which function as an optical guide for controlling the direction of light transmission and/or the angle of divergence.

11. A lamp as claimed in any one of claims 6 to 10, wherein the lamp includes a globe portion, with the junctions and the at least one curved conductor being embedded within the globe portion so that the lamp is formed as a unitary structure.

12. A lamp as claimed in claim 11, wherein the lamp includes a lens adapted to fit with the globe portion, and configured to shape the light emitted from the globe portion into a predetermined pattern.

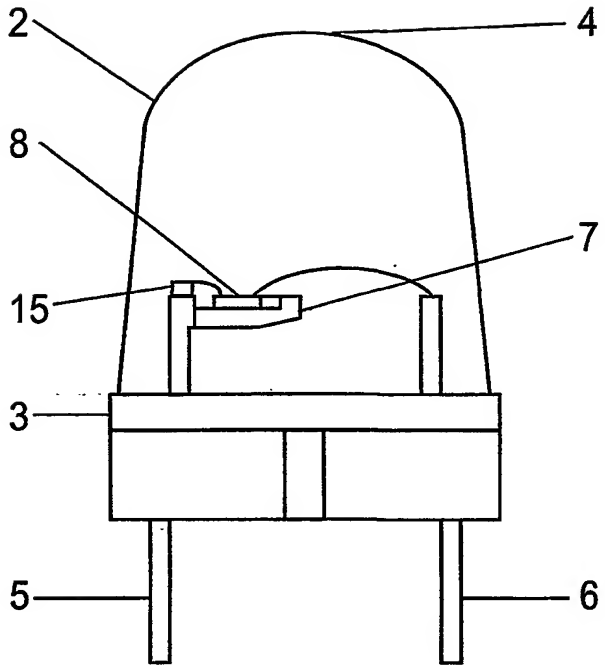


FIG 1

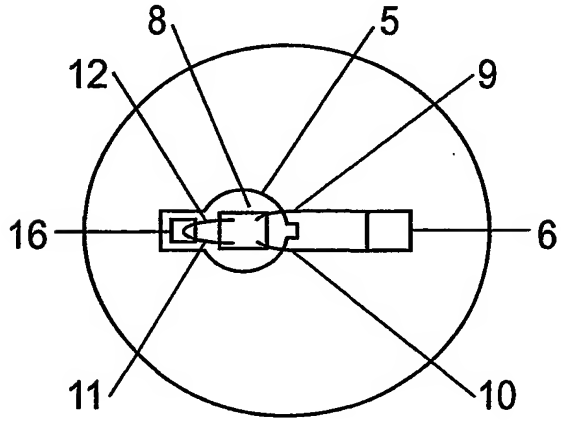


FIG 2

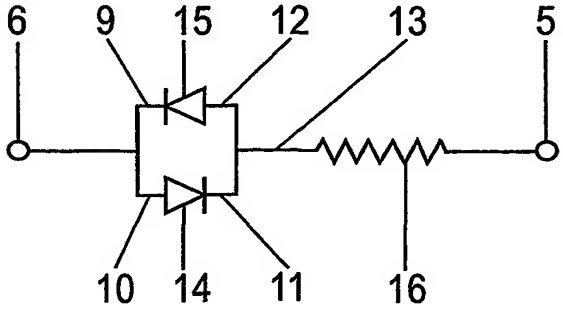
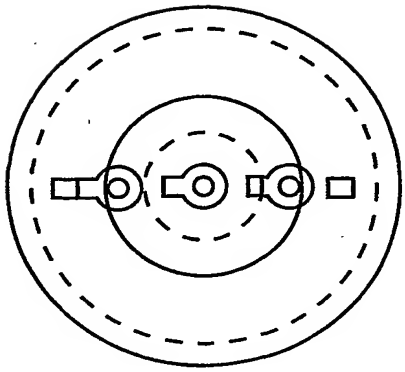


FIG 3

FIG 7



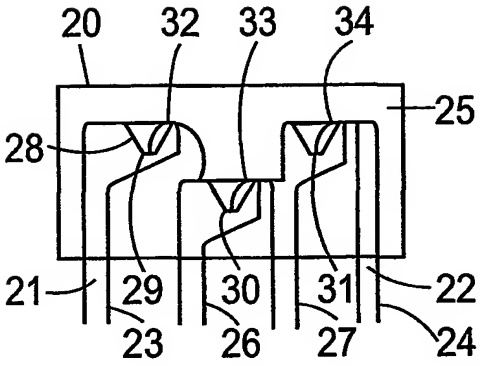


FIG 4

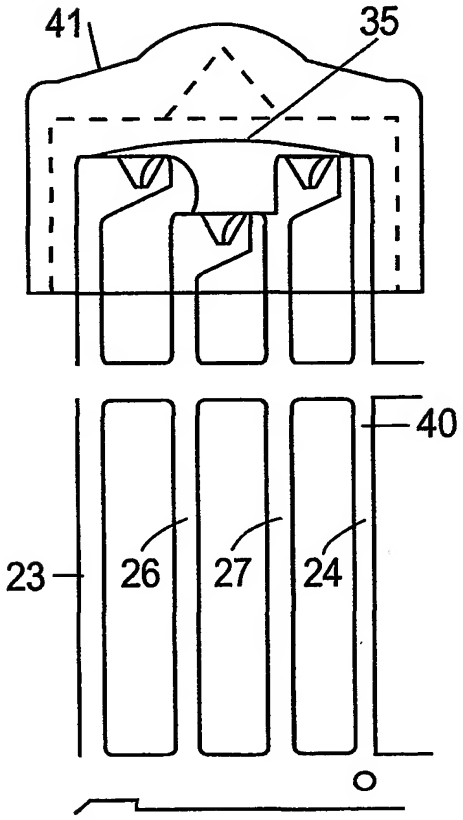


FIG 6

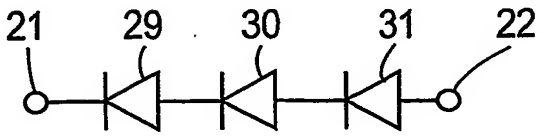


FIG 5

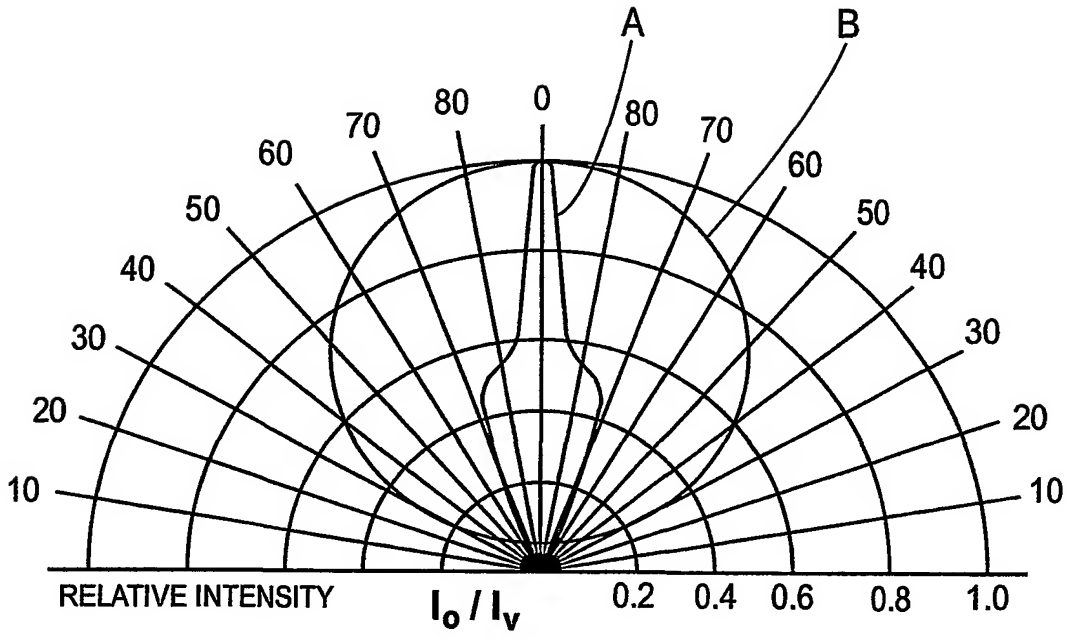

A
B
0
80
70
60
50
40
30
20
10
80
70
60
50
40
30
20
10
RELATIVE INTENSITY
I_o / I_v
0.2
0.4
0.6
0.8
1.0

FIG 8

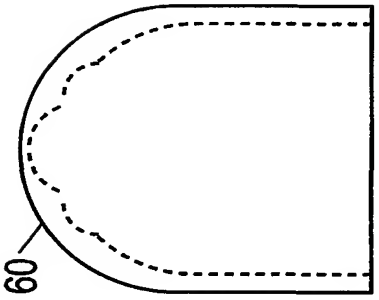


FIG 13

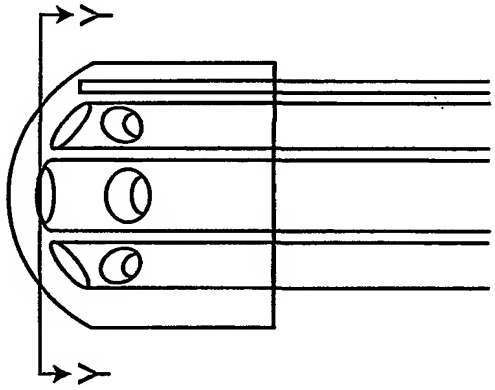


FIG 12

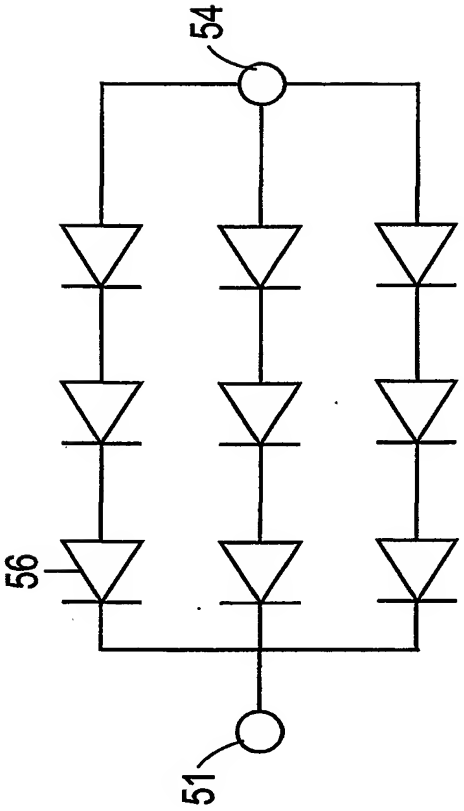


FIG 10

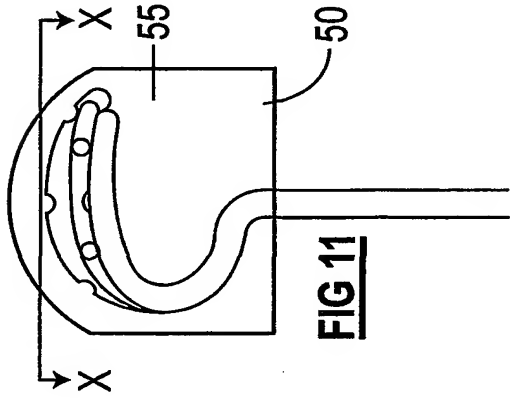


FIG 11

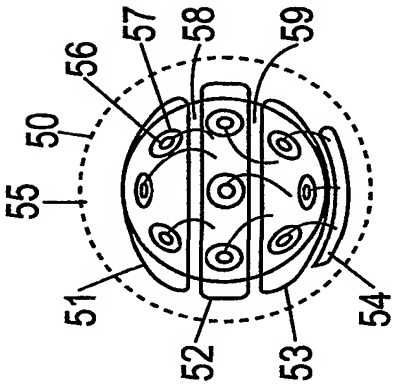


FIG 9

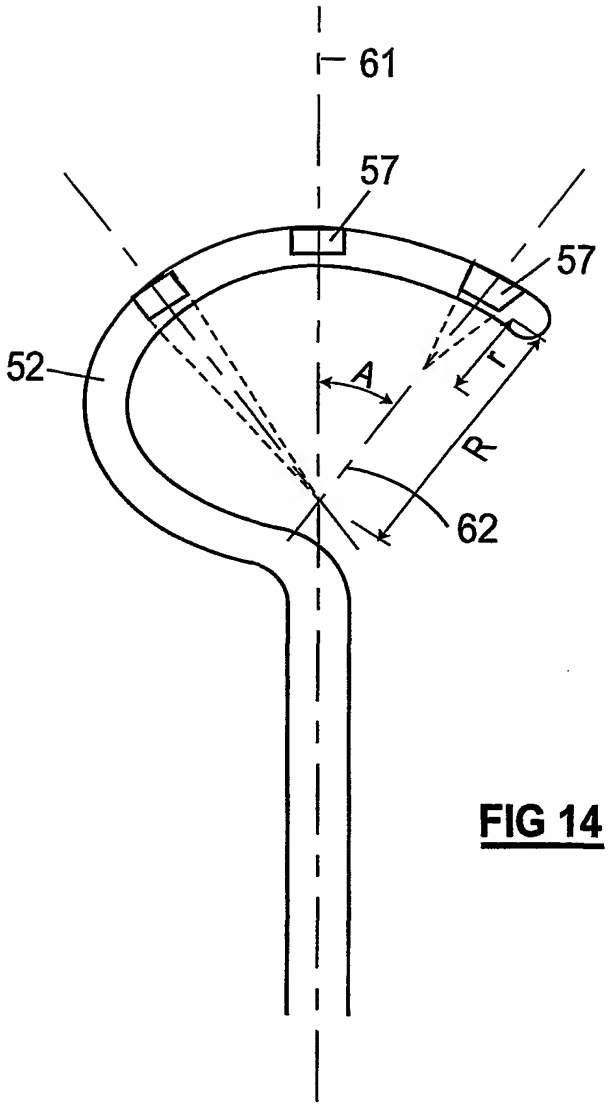


FIG 14

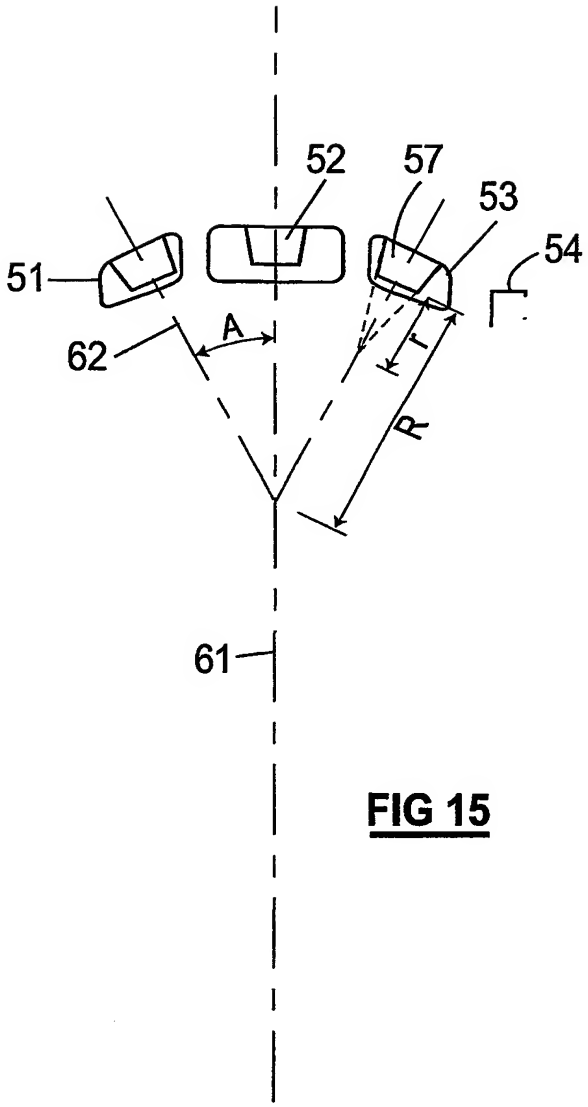


FIG 15

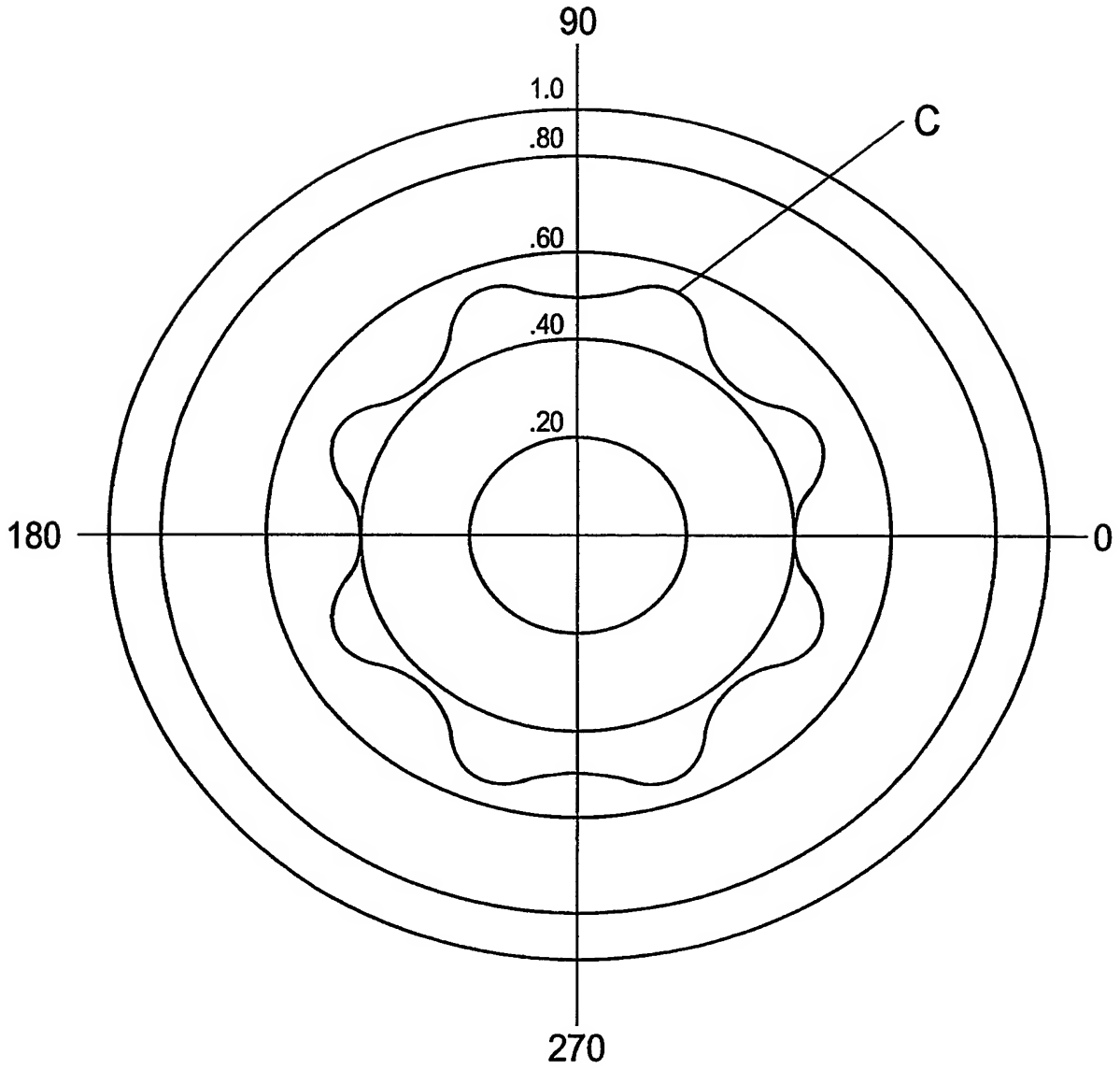


FIG 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: H01L 25/075, 33/00, 27/15, H05B 33/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01L 33/00, 25/075, 27/15, H05B 33/-, F21

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI, JAPIO:- IPC as above with keywords- (LED etc), (plurality, several etc), (phosphor+, fluoresc+), (plurality, several etc), (curv+, round+, convex+ etc),(base, support+ etc)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6068383 A (Robertson et al) 30 May 2000 See the abstract	1,2
X	US 5084804 A (Schairer) 28 January 1992 See the abstract	6,7
X	US 4473834 A (Soclof) 25 September 1984 See the abstract	1,2

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 August 2001	20 August 2001
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer I.A.BARRETT Telephone No : (02) 6283 2189

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3875456 A (Kano et al) 1 April 1975 See the abstract, col 3 lines 46-50, 61-64, col 6 lines 1-3	1,2
P,X	WO 01/33640 A1 (Osram Opto Semiconductors GMBH & Co.OHG) 10 May 2001 See the abstract	1,2
X	WO 00/02261 A1 (Osram Opto Semiconductors GMBH & Co.OHG) 13 January 2000 Osram Opto Semiconductors GMBH 7 Co.OHG See the abstract	1,2
P,X	EP 1098373 A2 (Page Aerospace Limited) 9 May 2001 See the abstract, col 2 lines 38-44	6,7,11,12
X	Derwent Abstract Accession No. 98-600102/51, Class X26, JP 10269822 A (Nichia Kagaku Kogyo KK) 9 October 1998 See the abstract	1
X	Patent Abstracts of Japan, JP 61-032483 A (Kimura Denki KK) 15 February 1986 See the abstract	6,7,11,12
A	US 5959316 A (Lowery) 28 September 1999 See the abstract	
A	Derwent Abstract Accession No. 91-304367/42, Class U11 U12, DE 4107526 A (Siemens AG) 10 October 1991 See the abstract	
A	FR 2779508 A1 (Valeo Vision Societe Anonyme) 10 December 1999 See the abstract	
A	FR 2588109 A1 (Valancogne) 3 April 1987 See the abstract	
A	DE 4124413 A1 (Herzhoff) 28 January 1993 See the abstract, fig 2	
A	Derwent Abstract Accession No. 1999-597015/51, Class U11, JP 11261114 A (Nichia Kagaku Kogyo KK) 24 September 1999	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

C (C ntinuati n) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Derwent Abstract Accession No. 98-473342/41, Class U11 U12, JP 10200168 A (Toyoda Gosei KK) 31 July 1998	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

Box I **Observati ns where certain claims were found unsearchable (Continuation of item 2 f first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos :

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos :

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II **Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

There are two inventions.
(a) Claims 1 to 5 are characterised by a plurality of light emitting junctions with a common fluorescent layer.
(b) Claims 6 to 12 are characterised by a plurality of light emitting junctions mounted to at least one curved conductor.
There are no characterising features in common between these two sets of claims.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Pr test

☐ The additional search fees were accompanied by the applicant's protest.

☐ N protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU01/00717

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	6068383	DE	19948592	GB	2355063		
US	5084804	DE	3835942	EP	364806	JP	2192605
US	4473834	NONE					
US	3875456	JP	48102585				
WO	200133640	NONE					
WO	200002261	EP	1099258				
EP	1098373	GB	2356037				
JP	10269822	NONE					
JP	61032483	NONE					
US	5959316	DE	19919381	GB	2341274	JP	2000077723
DE	4107526	US	5126587				
FR	2779508	NONE					
FR	2588109	NONE					
DE	4124413	NONE					
JP	11261114	NONE					
JP	10200168	NONE					

END OF ANNEX

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: H01L 25/075, 33/00, 27/15, H05B 33/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01L 33/00, 25/075, 27/15, H05B 33/-, F21

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI, JAPIO:- IPC as above with keywords- (LED etc), (plurality, several etc), (phosphor+, fluoresc+), (plurality, several etc), (curv+, round+, convex+ etc),(base, support+ etc)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6068383 A (Robertson et al) 30 May 2000 See the abstract	1,2
X	US 5084804 A (Schairer) 28 January 1992 See the abstract	6,7
X	US 4473834 A (Soclof) 25 September 1984 See the abstract	1,2

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 August 2001	20 August 2001
Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	I.A.BARRETT Telephone No : (02) 6283 2189

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3875456 A (Kano et al) 1 April 1975 See the abstract, col 3 lines 46-50, 61-64, col 6 lines 1-3	1,2
P,X	WO 01/33640 A1 (Osram Opto Semiconductors GMBH & Co.OHG) 10 May 2001 See the abstract	1,2
X	WO 00/02261 A1 (Osram Opto Semiconductors GMBH & Co.OHG) 13 January 2000 Osram Opto Semiconductors GMBH 7 Co.OHG See the abstract	1,2
P,X	EP 1098373 A2 (Page Aerospace Limited) 9 May 2001 See the abstract, col 2 lines 38-44	6,7,11,12
X	Derwent Abstract Accession No. 98-600102/51, Class X26, JP 10269822 A (Nichia Kagaku Kogyo KK) 9 October 1998 See the abstract	1
X	Patent Abstracts of Japan, JP 61-032483 A (Kimura Denki KK) 15 February 1986 See the abstract	6,7,11,12
A	US 5959316 A (Lowery) 28 September 1999 See the abstract	
A	Derwent Abstract Accession No. 91-304367/42, Class U11 U12, DE 4107526 A (Siemens AG) 10 October 1991 See the abstract	
A	FR 2779508 A1 (Valeo Vision Societe Anonyme) 10 December 1999 See the abstract	
A	FR 2588109 A1 (Valancogne) 3 April 1987 See the abstract	
A	DE 4124413 A1 (Herzhoff) 28 January 1993 See the abstract, fig 2	
A	Derwent Abstract Accession No. 1999-597015/51, Class U11, JP 11261114 A (Nichia Kagaku Kogyo KK) 24 September 1999	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Derwent Abstract Accession No. 98-473342/41, Class U11 U12, JP 10200168 A (Toyoda Gosei KK) 31 July 1998	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU01/00717

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DE	4107526	US	5126587				
FR	2779508	NONE					
FR	2588109	NONE					
DE	4124413	NONE					
JP	11261114	NONE					
JP	10200168	NONE					

END OF ANNEX

ATENT COOPERATION TREA

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
2427919DH		

International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/AU01/00717	15 June 2001	15 June 2000

Applicant

SYSTEMAX PTY. LTD. et al

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [X] **Unity of invention is lacking** (See Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. **11**

[X] as suggested by the applicant.

[ ] None of the figures

[ ] because the applicant failed to suggest a figure

[ ] because this figure better characterizes the invention

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00717

Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos :

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos :

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

There are two inventions.
(a) Claims 1 to 5 are characterised by a plurality of light emitting junctions with a common fluorescent layer.
(b) Claims 6 to 12 are characterised by a plurality of light emitting junctions mounted to at least one curved conductor.
There are no characterising features in common between these two sets of claims.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark n Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.